



Horizon Project

---

# NMC Horizon Project Preview

## 2012 K-12 Edition

## NMC Horizon Project Preview: 2012 K-12 Edition

### **Time-to-Adoption Horizon: One Year or Less**

- Mobiles and Apps
- Tablet Computing

### **Time-to-Adoption Horizon: Two to Three Years**

- Game-Based Learning
- Personal Learning Environments

### **Time-to-Adoption Horizon: Four to Five Years**

- Augmented Reality
- Natural User Interfaces

### **Key Trends**

### **Significant Challenges**

## Time-to-Adoption: One Year or Less

### Mobiles and Apps

Mobile phones — distinct from new sorts of larger format mobile devices such as tablets — have as a category proven more interesting and more capable with each passing year. Smartphones including the iPhone and Android have redefined what we mean by mobile computing, and in the past three to four years, the small, often simple, low cost software extensions to these devices — apps — have become a hotbed of development. New tools are free or sell for as little as 99 cents. A popular app can see millions of downloads in a short time, and that potential market has spawned a flood of creativity that is instantly apparent in the extensive collections available in the app stores. Apple's app store recently passed 25 billion downloads — with 10 billion in just the last eight months — and simple but useful apps have found their way into almost every form of human endeavor. The power of apps, coupled with the portability of mobile devices, is causing many schools to take another look at their policies regarding mobile devices. Many see mobiles as a key aspect of Bring Your Own Device (BYOD) environments.

### Tablet Computing

In the past year, advances in tablets have captured the imagination of educators around the world. Led by the incredible success of the iPad, which in 2011-12 was selling at the rate of more than 3 million units a month, other similar devices such as the Samsung Galaxy and Sony's Tablet S have also begun to enter this rapidly growing new market. In the process, the tablet (a form that is distinct from tablet PCs) have come to be viewed as not just a new category of mobile devices, but indeed a new technology in its own right, one that blends features of laptops, smartphones, and earlier tablet computers with always-connected Internet, and thousands of apps with which to personalize the experience. As these new devices have become more used and understood, it is clear that they are independent and distinct from other mobile devices such as smartphones, eReaders, or tablet PCs. With significantly larger screens and richer gesture-based interfaces than their smartphone predecessors, they are ideal tools for sharing content, videos, images, and presentations because they are easy for anyone to use, visually compelling, and highly portable.

## **Time-to-Adoption: Two to Three Years**

### **Game-Based Learning**

Game-based learning has gained considerable traction since 2003, when James Gee began to describe the impact of game play on cognitive development. Since then, research — and interest in — the potential of gaming on learning has exploded, as has the diversity of games themselves, with the emergence of serious games as a genre, the proliferation of gaming platforms, and the evolution of games on mobile devices. Developers and researchers are working in every area of game-based learning, including games that are goal-oriented; social game environments; non-digital games that are easy to construct and play; games developed expressly for education; and commercial games that lend themselves to refining team and group skills. Role-playing, collaborative problem solving, and other forms of simulated experiences are recognized for having broad applicability across a wide range of disciplines.

### **Personal Learning Environments**

Personal learning environments (PLEs) are described as ways to support self-directed and group-based learning, designed around each user's goals, with great capacity for flexibility and customization. PLEs are conceived as drawing on a variety of discrete tools, often chosen by the learner, which can be connected or used in concert in a transparent way. Using a growing set of free and simple tools and applications, such as a collection of apps on a tablet, it is already quite easy to support one's social, professional, learning and other activities. While the concept of PLEs is still fairly fluid, it does seem to be clear that a PLE is not simply a technology but an approach or process that is individualized by design, and thus different from person to person. Widespread adoption of PLEs may require shifts in policy, as well as attitudes, toward technology for teaching, and learning.

## Time-to-Adoption: Four to Five Years

### Augmented Reality

Augmented reality (AR), a capability that has been around for decades, is shifting from what was once seen as a gimmick to a tool with tremendous potential. The layering of information over 3D space produces a new experience of the world, sometimes referred to as “blended reality,” and is fueling the broader migration of computing from the desktop to the mobile device, bringing with it new expectations regarding access to information and new opportunities for learning. While the most prevalent uses of augmented reality so far have been in the consumer sector (for marketing, social engagement, amusement, or location-based information), new uses seem to emerge almost daily, as tools for creating new applications become even easier to use. A key characteristic of augmented reality is its ability to respond to user input. This interactivity confers significant potential for learning and assessment; with it, students can construct new understanding based on interactions with virtual objects that bring underlying data to life. Dynamic processes, extensive datasets, and objects too large or too small to be manipulated can be brought into a student’s personal space at a scale and in a form easy to understand and work with.

### Natural User Interfaces

It is already common to interact with a new class of devices entirely by using natural movements and gestures. The Microsoft Surface, iPad, iPhone and iPod Touch, the Nintendo Wii, and other natural user interfaces accept input in the form of taps, swipes, and other ways of touching, hand and arm motions, or body movement. These are the first in a growing array of alternative input devices that allow computers to recognize and interpret natural physical gestures as a means of control. Natural user interfaces allow users to engage in virtual activities with movements similar to what they would use in the real world, manipulating content intuitively. The idea of being able to have a completely natural interaction with your device is not new, but neither has its full potential been realized. In previous years, the *NMC Horizon Report* has documented two major development paths for natural user interfaces: marker-based and markerless. While both pathways continue to see development, what makes natural user interfaces interesting now is the increasingly high fidelity of systems that understand gestures and their nuances, as well as the convergence of gesture-sensing technology with voice recognition, which allows for both gesture and voice to communicate the user’s intentions to devices.

## Key Trends

**The abundance of resources and relationships made easily accessible via the Internet is increasingly challenging us to revisit our roles as educators.** Institutions must consider the unique value that each adds to a world in which information is everywhere. In such a world, sense-making and the ability to assess the credibility of information are paramount. Mentoring and preparing students for the world in which they will live is again at the forefront. K-12 institutions have always been seen as critical paths to educational credentialing, but challenges from competing sources are redefining what these paths can look like.

**As the cost of technology drops and school districts revise and open up their access policies, it is becoming increasingly common for students to bring their own mobile devices.** Many schools are launching BYOD programs so that students can use the devices they already have as learning tools within a traditional classroom setting in addition to informal and out-of-school environments. This is happening partly because of how BYOD impacts budgets; schools can spend less money on technology if students use their own, which frees up the school-supplied technology for students who cannot afford to buy devices. In turn, schools do not need to purchase and maintain a large amount of hardware. The surge of BYOD in K-12 can also be attributed to an attitude shift as schools are beginning to embrace the use of mobiles both in and outside of the classroom as an engaging way to learn.

**Education paradigms are shifting to include online learning, hybrid learning and collaborative models.** Budget cuts have forced institutions to re-evaluate their education platforms and find alternatives to the exclusive face-to-face learning models. As such, what once was seen as a challenge has now become an increasingly interesting trend. Students already spend much of their free time on the Internet, learning and exchanging new information through various resources, including social networks. Institutions that embrace face-to-face/online hybrid learning models have the potential to leverage the online skills learners have already developed independent of academia. We are beginning to see developments in online learning that offer similar — if not better — environments than physical campuses, including opportunities for increased collaboration while equipping students with stronger digital skills. Hybrid models, when designed and implemented successfully, enable students to learn at their own pace and style, whenever they want from wherever they are.

**People expect to be able to work, learn, and study whenever and wherever they want to.** Life in an increasingly busy world where learners must balance demands from home, work, school, and family poses a host of logistical challenges with which today's ever more mobile students must cope. A faster approach is often perceived as a better approach, and as such people want easy and timely access not only to the information on the network, but to their social networks that can help them to interpret it and maximize its value. The implications for informal learning are profound, as are the notions of "just-in-time" learning and "found" learning, both ways of maximizing the impact of learning by ensuring it is timely and efficient.

**Technology continues to profoundly affect the way we work, collaborate, communicate, and succeed.** Increasingly, technology skills are critical to success in almost every arena, and those who are more facile with technology will advance while those without access or skills will not. The digital divide, once seen as a factor of wealth, is now seen as a factor of education: those who have the opportunity to learn technology skills are in a better position to obtain and make use of technology than those who do not. Evolving occupations, multiple careers, and an increasingly mobile workforce contribute to this trend.

**There is a new emphasis in the classroom on more challenge-based and active learning.**

Challenge-based learning and similar methods foster more active learning experiences, both inside and outside the classroom. As technologies such as tablets and smartphones now have proven applications in higher education institutions, educators are leveraging these tools, which students already use, to connect the curriculum with real life issues. The active learning approaches are decidedly more student-centered, allowing them to take control of how they engage with a subject and to brainstorm and implement solutions to pressing local and global problems. The hope is that if learners can connect the course material with their own lives and their surrounding communities, then they will become more excited to learn and immerse themselves in the subject matter. Studies of challenge-based learning in practice, including two authored by the NMC, depict an increase in the uptake of 21<sup>st</sup> Century Skills among learners, including leadership and creativity.

## Significant Challenges

**The demand for personalized learning is not adequately supported by current technology or practices.** The increasing demand for education that is customized to each student's unique needs is driving the development of new technologies that provide more learner choice and control and allow for differentiated instruction, but there remains a gap between the vision and the tools needed to achieve it. It has become clear that one-size-fits-all teaching methods are neither effective nor acceptable for today's diverse students. Technology can and should support individual choices about access to materials and expertise, amount and type of educational content, and methods of teaching.

**Digital media literacy continues its rise in importance as a key skill in every discipline and profession.** This challenge, driven by a related trend, appears here because despite the widespread agreement on the importance of digital media literacy, training in the supporting skills and techniques is rare in teacher education. As classroom professionals begin to realize that they are limiting their students by not helping them to develop and use digital media literacy skills across the curriculum, the lack of formal training is being offset through professional development or informal learning, but we are far from seeing digital media literacy as a norm. This challenge is exacerbated by the fact that digital literacy is less about tools and more about thinking, and thus skills and standards based on tools and platforms have proven to be somewhat ephemeral.

**Institutional barriers present formidable challenges to moving forward in a constructive way with emerging technologies.** A key challenge is the fundamental structure of the K-12 education establishment — aka “the system.” As long as maintaining the basic elements of the existing system remains the focus of efforts to support education, there will be resistance to any profound change in practice. Learners have increasing opportunities to take their education into their own hands, and options like informal education, online education, and home-based learning are attracting students away from traditional educational settings. If the system is to remain relevant it must adapt, but major change comes hard in education. Too often it is education's own processes and practices that limit broader uptake of new technologies. Much resistance to change is simply comfort with the status quo, but in other cases, such as in promotion and tenure reviews, experimentation or innovative applications of technologies is often seen as outside the role of researcher or scientist.

**K-12 must tackle the increased blending of formal and informal learning.** Traditional lectures and subsequent testing are still dominant learning vehicles in schools. In order for students to get a well-rounded education with real world experience, they must also engage in more informal in-class activities as well as learning outside the classroom. Schools should encourage students to experiment and take risks without the fear of formal consequences. A new model, called the “flipped classroom,” has students watching teacher-created instructional videos at home, and using class time to collaborate with classmates and problem-solve. Some of the main challenges in this tactic are designing an effective blended learning model and getting buy-in from school administration.

**Learning that incorporates real life experiences is not occurring enough and is undervalued when it does take place.** This challenge is an important one in K-12 schools, because it results in a lack of engagement in learning on the part of students who are seeking some connection between their own lives and their experience in school. Use of technology tools that are already familiar to students, project-based learning practices that incorporate real-life experiences, and mentoring from community members are a few practices that support increased engagement. Practices like these may help retain students in school and prepare them for further education, careers, and citizenship in a way that traditional practices are failing to do.



**Many activities related to learning and education take place outside the walls of the classroom and thus are not part of traditional learning metrics.** Students can take advantage of learning material online, through games and programs they may have on systems at home, and through their extensive — and constantly available — social networks. The experiences that happen in and around these venues are difficult to tie back to the classroom, as they tend to happen serendipitously and in response to an immediate need for knowledge, rather than being related to topics currently being studied in school.

